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Effect of Land Uses on Soil Physical Qualities in Mountainous Ecosystem of Western Ghats, India

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The present study attempts to relate the soil physical quality with five different land uses (Shola forest, *Eucalyptus* plantation, wattle plantation, grass land and scrub land) of a forest area (Udhagai range), which comes under Nilgiri south forest division, Nilgiri District, Tamil Nadu State. The objective of the study was to investigate the effects of different land uses on soil physical quality. The soil samples were collected from different land uses at 0-15 cm (surface) and 15-30 cm (sub-surface) depth and were analyzed for soil physical properties with standard procedures. The results showed that soil texture is clay in all the land uses except in grassland which is clay loam. The higher sand (41.8%) and silt (25.4%) contents were recorded in the surface layer of grassland, and the lower values were recorded under wattle plantation. The clay content was higher in Shola forest (68.6%) and lower in grassland. The higher bulk density was recorded in scrub land (1.62 Mg m^{-3}) and the least in grass land (1.35 Mg m^{-3}); the particle density was higher in Shola forest (2.60 Mg m^{-3}) and lower under grassland (2.36 Mg m^{-3}). The soil samples of different land uses recorded wide variation in porosity, the highest being recorded in the Shola forest (57.1%) and lowest (45.8%) in wattle plantation. Shola forest recorded the highest available soil moisture (13.7%, w/w basis), and the lowest was with *Eucalyptus* plantation (9.3%). Shola forest and wattle plantations have soils with superior physical quality. Soils under *Eucalyptus* plantation and scrub lands recorded with poor physical quality which are prone to soil erosion and may deteriorate further. It is suggested that growing cover crops will minimize soil erosion and improve soil physical quality. Implementing soil and water conservation measures such as stone walls and continuous trenches will reduce soil losses and improve water availability and biomasses.

Key words: Land use, soil physical qualities, soil quality index, Western Ghats